250044

MATTARELLI : ~~370137~~

SOLID STATE

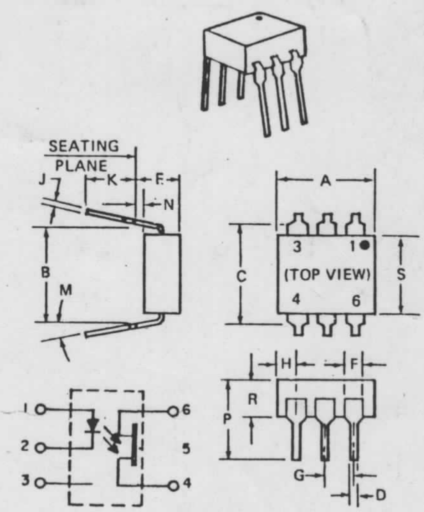
OPTOELECTRONICS

H11F1, H11F2, H11F3

£ 4'500 (non disp.) £. 2'200

Photon Coupled Bilateral Analog FET

The General Electric H11F family consists of a gallium arsenide infrared emitting diode coupled to a symmetrical bilateral silicon photo detector. The detector is electrically isolated from the input and performs like an ideal isolated FET designed for distortion-free control of low level A.C. and D.C. analog signals.



FEATURES:

As a Remote Variable Resistor –
- $\leq 100\Omega$ to $\geq 300M\Omega$
- $\geq 99.9\%$ Linearity
- ≤ 15 pF Shunt Capacitance
- $\geq 100G\Omega$ I/O Isolation Resistance

As An Analog Signal Switch –
- Extremely Low Offset Voltage
- 60V pk-pk Signal Capability
- No Charge Injection or Latchup
- t_{on}, t_{off} $\leq 15\mu$sec.

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	8.38	8.89	.330	.350	
B	7.62 REF.		.300 REF.		1
C	–	8.64	–	.340	2
D	.406	.508	.016	.020	
E	–	5.08	–	.200	3
F	1.0!	1.78	.040	.070	
G	2.28	2.80	.090	.110	
H	–	2.16	–	.085	4
J	.203	.305	.008	.012	
K	2.54	–	.100	–	
M	–	15°	–	15°	
N	.381	–	.015	–	
P	–	9.53	–	.375	
R	2.92	3.43	.115	.135	
S	6.10	6.86	.240	.270	

NOTES:
1. INSTALLED POSITION LEAD CENTERS.
2. OVERALL INSTALLED DIMENSION.
3. THESE MEASUREMENTS ARE MADE FROM THE SEATING PLANE.
4. FOUR PLACES.

Absolute Maximum Ratings: (25°C Unless Otherwise Specified)

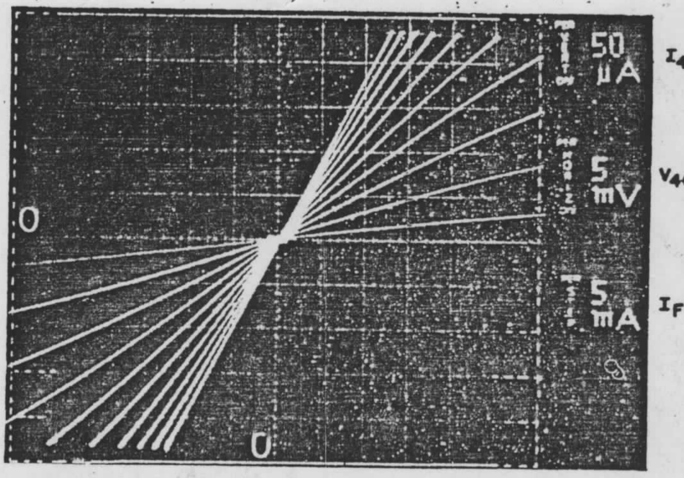
INFRARED EMITTING DIODE		
Power Dissipation	$T_A = 25°C$	*150 milliwatts
Forward Current (Continuous)		60 milliamps
Forward Current (Peak) (Pulse Width 100μsec 100 pps)		500 milliamps
Forward Current (Peak) (Pulse Width 1μsec 300 pps)		3 amps
Reverse Voltage		6 volts

*Derate 2.0 mW/°C above 25°C.

PHOTO DETECTOR		
Power Dissipation	$T_A = 25°C$	**300 milliwatts
Breakdown Voltage		
H11F1 – H11F2		± 30 volts
H11F3		± 15 volts
Detector Current (Continuous)		±100 milliamps

**Derate 4.0 mW/°C above 25°C.

TOTAL DEVICE		
Storage Temperature		-55 to +150°C
Operating Temperature		-55 to +100°C
Lead Soldering Time (at 260°C),		10 Seconds
Surge Isolation Voltage (Input to Output)		
H11F1–H11F2	2500 $V_{(peak)}$	1770 $V_{(RMS)}$
H11F3	1500 $V_{(peak)}$	1060 $V_{(RMS)}$
Steady-State Isolation Voltage (Input to Output)		
H11F1–H11F2	1500 $V_{(peak)}$	1060 $V_{(RMS)}$
H11F3	1000 $V_{(peak)}$	700 $V_{(RMS)}$



TYPICAL LOW LEVEL OUTPUT CHARACTERISTIC

Ⓡ Covered under U.L. component recognition program, reference file E51868

VDE Approved to 0883/6.80 0110b Certificate # 35025

Individual Electrical Characteristics: (25°C Unless Otherwise Specified)

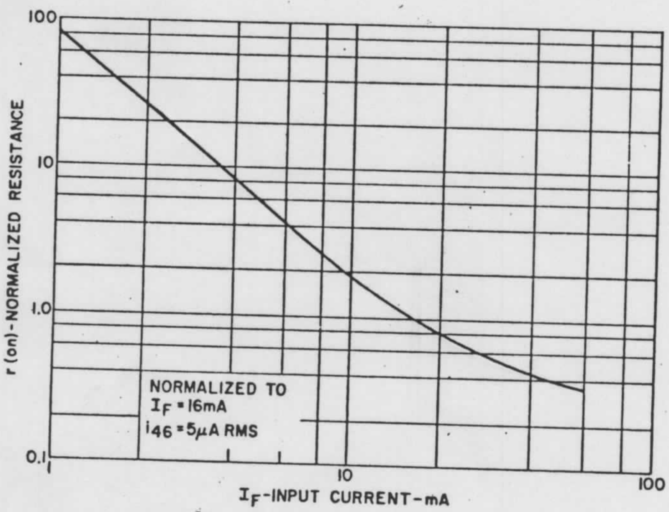
INFRARED EMITTING DIODE	TYP.	MAX.	UNITS
Forward Voltage (I_F = 16 mA)	1.1	1.75	volts
Reverse Current (V_R = 6V)	–	10	microamps
Capacitance (V = 0, f = 1 MHz)	50	–	picofarads

PHOTO-DETECTOR (Either Polarity)	MIN.	MAX.	UNITS
Breakdown Voltage–$V_{(BR)\,46}$ (I_{46} = 10μA; I_F = 0) – F1,2	30	–	volts
– F3	15	–	volts
Off-State Dark Current – I_{46} (V_{46}=15V; I_F=0; T_A = 25°C)	–	50	nanoamps
(V_{46}=15V; I_F=0; T_A=100°C)	–	50	microamps
Off-State Resistance – r_{46} (V_{46} = 15V; I_F = 0)	300	–	megohms
Capacitance – C_{46} (V_{46} = 0, I_F = 0, f = 1 MHz)	–	15	picofarads

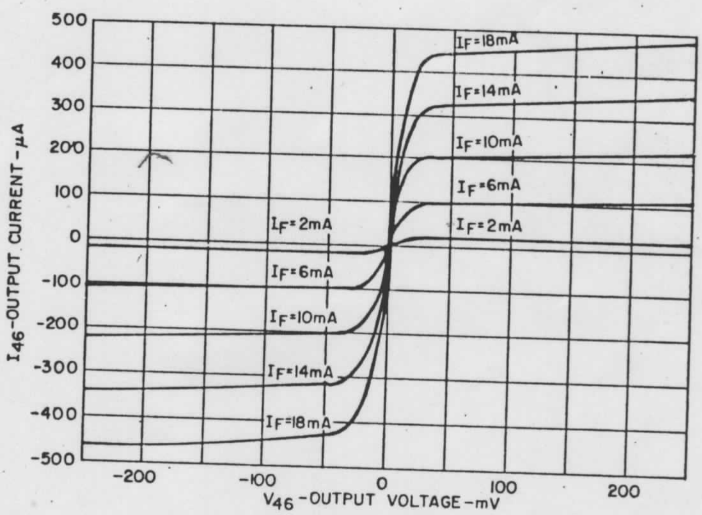
Coupled Electrical Characteristics: (25°C)

		MIN.	TYP.	MAX.	UNITS
On-State Resistance – r_{46} (I_F = 16mA, I_{46} = 100μA)	H11F1	–	–	200	ohms
	H11F2	–	–	330	ohms
	H11F3	–	–	470	ohms
On-State Resistance – r_{64} (I_F = 16 mA, I_{64} = 100μA)	H11F1	–	–	200	ohms
	H11F2	–	–	330	ohms
	H11F3	–	–	470	ohms
Isolation Resistance (Input to Output) (V_{IO}= 500V)		100	–	–	gigohms
Input to Output Capacitance (V_{IO} = 0, f = 1 MHz)		–	–	2	picofarads
Turn-On Time – t_{on} (I_F = 16mA, R_L = 50Ω, V_{46} = 5V)		–	–	15	microseconds
Turn-Off Time – t_{off} (I_F = 16mA, R_L = 50Ω, V_{46} = 5V)		–	–	15	microseconds
Resistance, Non-Linearity and Asymmetry (I_F = 16mA, i_{46} = 25μA RMS, f = 1 KHz)		–	–	0.1	percent

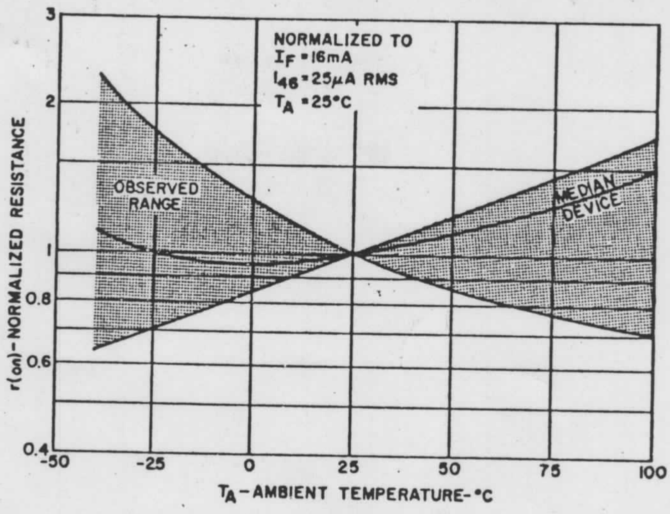
TYPICAL CHARACTERISTICS (25°C) – EITHER POLARITY



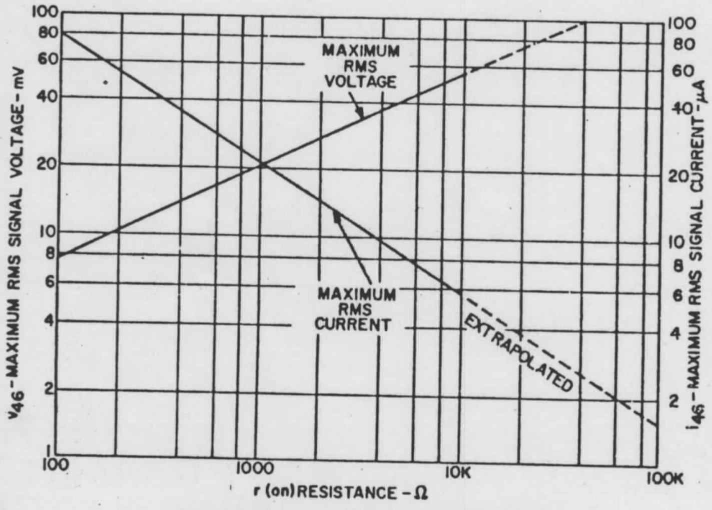
1. RESISTANCE VS. INPUT CURRENT



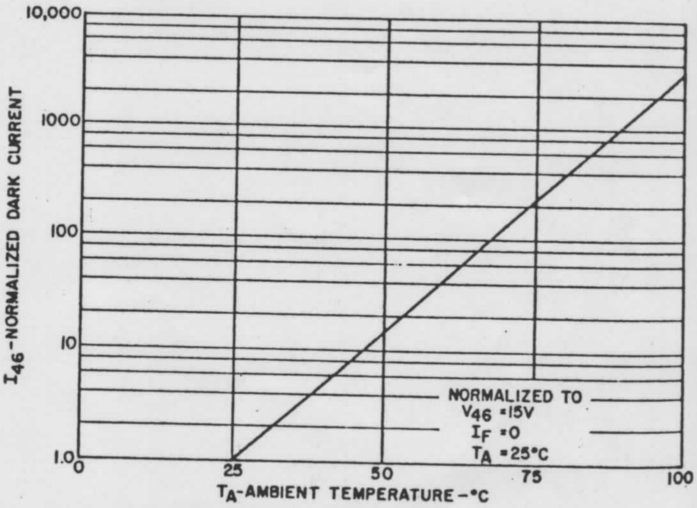
2. OUTPUT CHARACTERISTICS



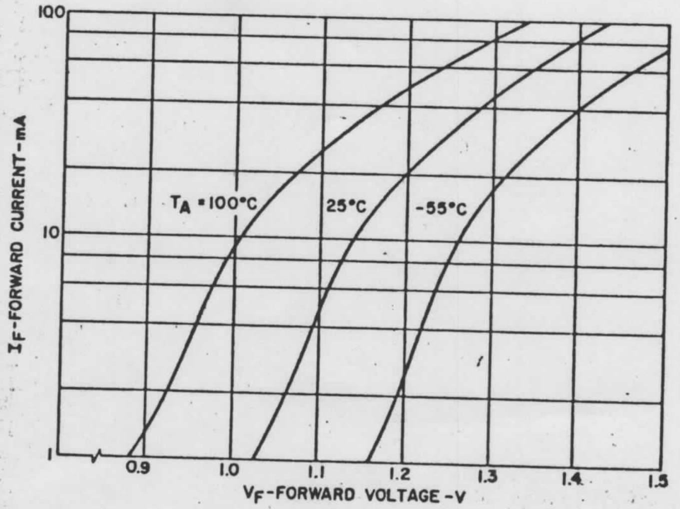
3. RESISTANCE VS. TEMPERATURE



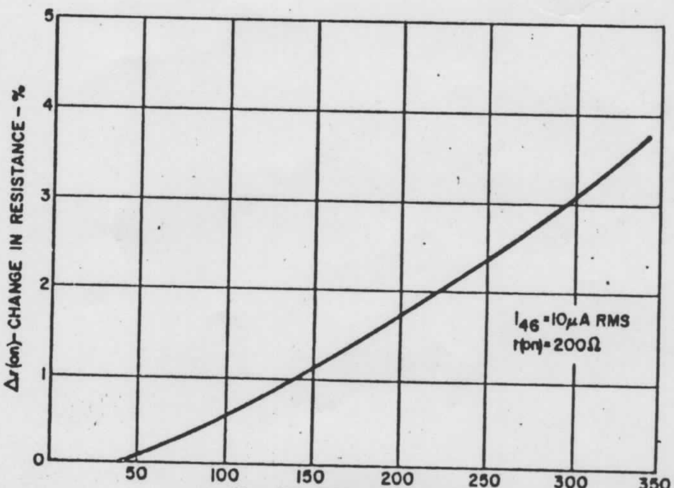
4. REGION OF LINEAR RESISTANCE



5. OFF-STATE CURRENT VS. TEMPERATURE



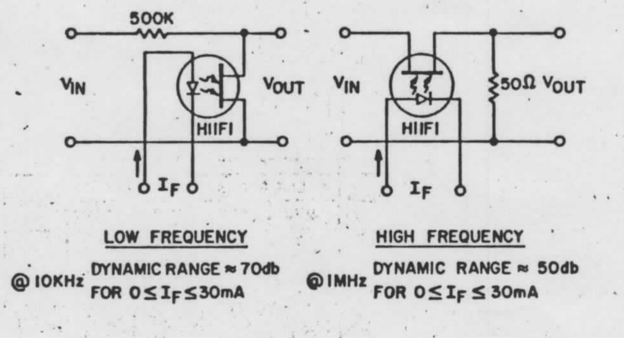
6. FORWARD VOLTAGE VS. FORWARD CURRENT



7. RESISTIVE NON-LINEARITY VS. D.C. BIAS

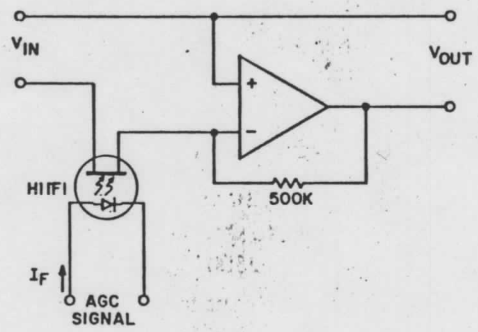
AS A VARIABLE RESISTOR

ISOLATED VARIABLE ATTENUATORS



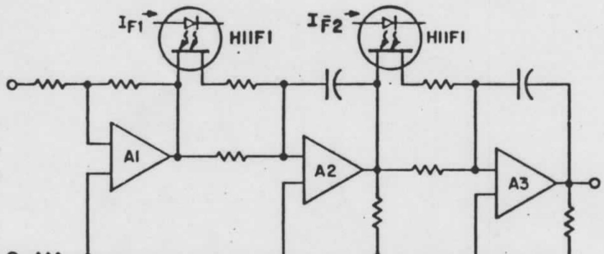
Distortion free attenuation of low level A.C. signals is accomplished by varying the IRED current, I_F. Note the wide dynamic range and absence of coupling capacitors; D.C. level shifting or parasitic feedback to the controlling function.

AUTOMATIC GAIN CONTROL



This simple circuit provides over 70db of stable gain control for an AGC signal range of from 0 to 30mA. This basic circuit can be used to provide programmable fade and attack for electronic music and can be modified with six components to a high performance compression amplifier.

ACTIVE FILTER FINE TUNING/BAND SWITCHING

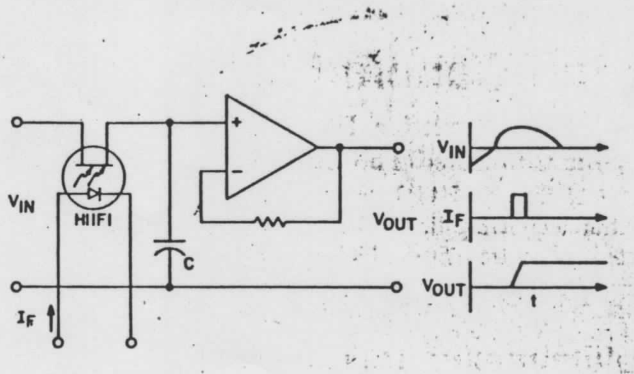


I_{F1} ADJUSTS f_1, I_{F2} ADJUSTS f_2

The linearity of resistance and the low offset voltage of the H11F allows the remote tuning or band-switching of active filters without switching glitches or distortion. This schematic illustrates the concept, with current to the H11F1 IRED's controlling the filter's transfer characteristic.

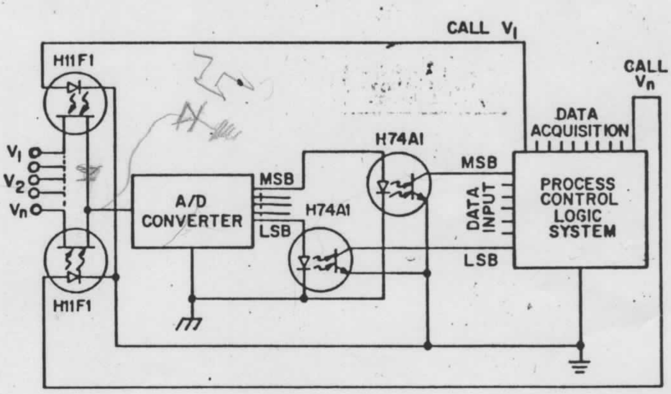
AS AN ANALOG SIGNAL SWITCH

ISOLATED SAMPLE AND HOLD CIRCUIT



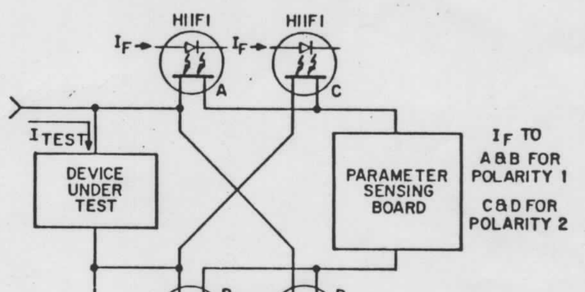
Accuracy and range are improved over conventional FET switches because the H11F has no charge injection from the control signal. The H11F also provides switching of either polarity input signal up to 30V magnitude.

MULTIPLEXED, OPTICALLY-ISOLATED A/D CONVERSION



The optical isolation, linearity and low offset voltage of the H11F allows the remote multiplexing of low level analog signals from such transducers as thermocouplers, Hall effect devices, strain gauges, etc. to a single A/D converter.

TEST EQUIPMENT – KELVIN CONTACT POLARITY



In many test equipment designs the auto polarity function uses reed relay contacts to switch the Kelvin Contact polarity. These reeds are normally one of the highest maintenance cost items due to sticking contacts and mechanical problems. The totally solid-state H11F eliminates these troubles while providing faster switching.